

WHAT IS CLAIMED IS:

1. An image input apparatus comprising:

an image pickup region including a plurality of  
pixels each for converting an optical image from an  
5 object into electrical image information and  
accumulating the electrical image information; and  
a processing circuit adapted to process the image  
information from said image pickup region,

wherein said processing circuit generates image  
10 data by performing a subtraction operation and an  
addition operation on the basis of a plurality of first  
image information read out in a time-series manner from  
the same pixel during one exposure operation, and a  
plurality of second image information sequentially read  
15 out from the same pixel in a shielded state.

2. An image input apparatus comprising image  
pickup means for converting an optical image from an  
object into electrical image information and  
20 accumulating the electrical image information,  
shielding means for shielding said image pickup means  
from incidence of the optical image, and processing  
means for processing the image information from said  
image pickup means,

25 wherein said processing means comprises first  
image information acquiring means for acquiring first  
image information accumulated in said image pickup

means with said shielding means open, second image  
information acquiring means for acquiring second image  
information accumulated in said image pickup means with  
said shielding means closed, subtraction processing  
5 means for executing a subtraction process between the  
acquisition result from said first image information  
acquiring means and the acquisition result from said  
second image information acquiring means, repetitive  
executing means for repetitively executing the  
10 operations by said first image information acquiring  
means, said second image information acquiring means,  
and said subtraction processing means a predetermined  
number of times, and addition means for adding the  
results of the repetitively executed subtraction  
15 process by said subtraction processing means.

3. An image input apparatus comprising image  
pickup means for converting an optical image from an  
object into electrical image information and  
20 accumulating the electrical image information,  
shielding means for shielding said image pickup means  
from incidence of the optical image, and processing  
means for processing the image information from said  
image pickup means,  
25 wherein said processing means comprises first  
image information acquiring means for acquiring first  
image information by closing said shielding means

before image pickup, second image information acquiring means for repetitively acquiring, a first predetermined number of times with said shielding means open, second image information accumulated in said image pickup  
5 means within a predetermined period, first subtraction processing means for executing a subtraction process between each acquisition result from said second image information acquiring means and the acquisition result from said first image information acquiring means,  
10 first addition means for adding the subtraction results from said first subtraction processing means, third image information acquiring means for repetitively acquiring, a second predetermined number of times while said image pickup means is closed after image pickup,  
15 third image information accumulated in said image pickup means within a predetermined period, second subtraction processing means for performing a subtraction process between each acquisition result from said third image information acquiring means and  
20 the acquisition result from said first image information acquiring means, second addition means for adding the subtraction results from said second subtraction processing means, and adding-up means for adding up said first and second addition means.

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4. An apparatus according to claim 3, wherein the first predetermined number of times and the second

predetermined number of times are the same.

5. An apparatus according to claim 3, wherein  
said second addition means comprises repetitive  
5 addition means for continuously repetitively adding, a  
plurality of times, the subtraction results obtained by  
said second subtraction processing means.

6. An apparatus according to claim 3, wherein the  
10 second predetermined number of times is smaller than  
the first predetermined number of times.

7. An apparatus according to claim 6, wherein  
said processing means comprises fourth image  
15 information acquiring means for acquiring fourth image  
information a third predetermined number of times with  
said shielding means closed, at timings different from  
the acquisition timings of said third image information  
acquiring means, normalizing means for normalizing the  
20 fourth image information acquired by said fourth image  
information acquiring means by the third predetermined  
number of times, and image processing means for  
performing image processing on the basis of the  
addition result from said first addition means and the  
25 normalization result from said normalizing means.

8. An image pickup apparatus comprising:

determining means for determining during photographing whether an exposure time exceeds a predetermined threshold value;

5 read-out means for performing a read-out operation a plurality of times to image pickup means for picking up an object image, during one exposure operation in case of that the exposure time exceeds the threshold value;

10 recording means for recording a plurality of video signals obtained by the plurality of read-out operations on a recording medium; and

15 generating means for generating a single video signal by arithmetically operating the plurality of video signals recorded.

9. An apparatus according to claim 8, wherein electric charge accumulated in said image pickup means is discharged once at the beginning of the first exposure operation.

20 10. An apparatus according to claim 8, wherein in case of that the exposure time exceeds the predetermined threshold value, said read-out means performs a read-out operation a plurality of times by  
25 using the threshold value as a maximum exposure time during the one-time exposure operation.

11. An apparatus according to claim 8, wherein dark-current signals read out before and after main exposure are used to correct a video signal of main exposure.

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12. An apparatus according to claim 8, wherein dark-current signals read out once before and after main exposure are used in an arithmetic operation of video signals of main exposure performed a plurality of times.

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13. An apparatus according to claim 8, wherein when a read-out operation is to be performed  $n$  times during the one exposure operation, the data bit length of digital data to be recorded on said recording medium is increased to not less than  $\log_2 n$  bits.

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14. An apparatus according to claim 8, wherein when a read-out operation is to be performed  $n$  times during the one exposure operation, an aperture control value is set to  $n$  times.

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15. An image data generating method comprising:  
a read-out step of reading out image information from an image pickup region including a plurality of pixels each for converting an optical image from an object into electrical image information and

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accumulating the electrical image information; and  
a processing step of processing the readout image  
information,

wherein said processing step comprises a step of  
5 generating image data by performing a subtraction  
operation and an addition operation on the basis of a  
plurality of first image information read out in a  
time-series manner from the same pixel during one  
exposure operation, and a plurality of second image  
10 information sequentially read out from the same pixel  
in a shielded state.

16. An image data processing method comprising an  
image pickup step of converting an optical image from  
an object into electrical image information and  
15 accumulating the electrical image information in image  
pickup means, a shielding step of shielding said image  
pickup means from incidence of the optical image by  
using shielding means, a the processing step of  
20 processing the image information from said image pickup  
means,

wherein the processing step comprises a first  
image information acquisition step of acquiring first  
image information accumulated in said image pickup  
25 means with said shielding means open, a second image  
information acquisition step of acquiring second image  
information accumulated in said image pickup means with

said shielding means closed, a subtraction step of  
executing a subtraction process between the first image  
information and the second image information, a  
repetition step of repetitively executing the first  
5 image information acquisition process, the second image  
information acquisition process, and the subtraction  
process a predetermined number of times, and an  
addition step of adding the results of the repetitively  
executed subtraction process.

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17. An image data processing method comprising an  
image pickup step of converting an optical image from  
an object into electrical image information and  
accumulating the electrical image information in image  
15 pickup means, a shielding step of shielding said image  
pickup means from incidence of the optical image by  
using shielding means, and a processing step of  
processing the image information from said image pickup  
means,

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wherein said processing step comprises a first  
image information acquisition step of acquiring first  
image information by closing said shielding means  
before image pickup, a second image information  
acquisition step of repetitively acquiring, a first  
25 predetermined number of times with said shielding means  
open, second image information accumulated in said  
image pickup means within a predetermined period, a



first subtraction processing step of executing a subtraction process between the repetitively acquired second image information and the first image information, a first addition step of adding the subtraction results obtained in the first subtraction processing step to calculate a first sum, a third image information acquisition step of repetitively acquiring, a second predetermined number of times while said image pickup means is closed after image pickup, third image information accumulated in said image pickup means within a predetermined period, a second subtraction processing step of performing a subtraction process between the repetitively acquired third image information and the first image information, a second addition step of adding the subtraction results obtained in the second subtraction processing step to calculate a second sum, and an adding-up step of adding up the first and second sums.

18. A method according to claim 17, wherein the first predetermined number of times and the second predetermined number of times are the same.

19. A method according to claim 17, wherein said second addition step comprises a repetitive addition step of continuously repetitively adding, a plurality of times, the subtraction results obtained in said

second subtraction processing step.

20. A method according to claim 17, wherein the  
second predetermined number of times is smaller than  
5 the first predetermined number of times.

21. A method according to claim 17, wherein said  
processing step comprises a fourth image information  
acquisition step of acquiring fourth image information  
10 a third predetermined number of times with said  
shielding means closed, at timings different from the  
acquisition timings in the third image information  
acquisition step, and

a normalization step of normalizing the fourth  
15 image information acquired in said fourth image  
information acquisition step by the third predetermined  
number of times, and an image processing step of  
performing image processing on the basis of the  
addition result in said first addition step and the  
20 normalization result in said normalization step.

22. A method of controlling an image pickup  
apparatus for performing a read-out operation to image  
pickup means during exposure, converting a video signal  
25 into digital data, and recording the data on a  
recording medium, comprising:

a determining step of determining during

photographing whether an exposure time exceeds a predetermined threshold value;

5 a read-out step of performing a read-out operation a plurality of times to said image pickup means, during a one-time exposure operation, in case of that the exposure time exceeds the threshold value;

a recording step of recording a plurality of video signals obtained by the plurality of read-out operations on said recording medium; and

10 a generating step of generating a single video signal by arithmetically operating the plurality of video signals recorded.